chapter 6

Saving, Investment, and the Current Account

In a completely closed economy, one that is cut off from the rest of the world, aggregate saving would necessarily equal aggregate investment. The output in the economy is divided between current consumption uses and investment, so that $Q = C + I$. At the same time, the income received by households, which is also equal to Q, must be divided between consumption and saving, so that $Q = C + S$. We see immediately that $I = S$, that investment must always equal saving. Both saving and investment represent that part of national output which is not used for current consumption.

Of course, the saving and the investment in a national economy are not necessarily made by the same households (and firms).[1] Some households might want to save without having investment projects to undertake, while other households might have investment projects but no saving. Financial markets solve the problem of getting the saving to those who want to invest. Through them, the savers would accumulate financial assets while the investors accumulate financial liabilities. To take one simple example, the investors could issue bonds to finance their investments that could be purchased by the households that seek to save.

In an open economy, however, in which a nation's residents trade goods and financial assets with residents in other economies, it is no longer true that a nation's saving must always equal the investment that takes place within the country. A nation's households might want to save more than they want to invest at home, with the excess saving lent to investors in other countries. In this case, the country would accumulate net financial claims against residents abroad.

But what happens to the national output that is produced but neither consumed nor invested? It is exported to foreigners. As we shall see, there is an intimate relationship between the saving-investment balance of a country and the net exports of the country.

[1] For analytical purposes, it is not necessary to distinguish at this point between households and firms, so our discussion is in terms of households for simplicity.

In this chapter, we study the determinants of national lending and borrowing from the rest of the world. The *current account of the balance of payments* is the key concept at the center of our discussion. (In addition to the economic analysis of the current account given in the chapter, we also discuss the *accounting* of the current account balance in an appendix.) When residents in one country lend more to foreigners than they borrow, and thus accumulate a net financial claim against the rest of the world, we say that the country has a *current account surplus*. When the country is accumulating a net liability (or running down its net claims) against the rest of the world, the economy has a *current account deficit*. A current account surplus exists when national saving exceeds national investment (with the difference lent abroad), and a current account deficit exists when national investment exceeds national saving. We shall see that the current account balance is closely related to the net export balance.

The current account has a crucial intertemporal dimension. The economy as a whole, like the individual households (and firms) that compose the economy, has an intertemporal budget constraint. If the economy runs a current account deficit today, its residents are increasing their net debt to the rest of the world. Eventually, the country will have to cut back on domestic consumption in order to pay the interest on the accumulated debts. As domestic consumption is cut back, national output that was used for consumption is increasingly used for net exports. As we shall see, the country's net exports are, in essence, its method of paying the interest burden on the liabilities accumulated while running current account deficits.

6-1 A Formal Analysis of Saving, Investment, and the Current Account

We now turn to a formal model of the current account. In order to simplify the theory, we continue (as in the past two chapters) to assume a classical, fully employed economy, with a stable price level for goods ($P = 1$). (Later on in the book, we will discuss the implications for the current account of aggregate demand–induced fluctuations in output within the framework of the Keynesian model.)

In a closed economy, saving must equal investment. Since both saving and investment are a function of the domestic interest rate, r, we can draw the saving and investment schedules, as we do in Figure 6-1, with saving an increasing function of r and investment a decreasing function of r.[2] Of course, saving and investment are also functions of many other things: current and future income, expected profitability, and so on. These other factors are held fixed in the background when we draw saving and investment schedules like those in the graph. The domestic interest rate adjusts to equilibrate saving and investment at the level given by the equilibrium point E.

We can see the effects of various kinds of shocks on domestic saving, investment, and interest rates quite clearly. Consider, for example, the ef-

[2] Remember from Chapter 4 that the effect of a rise in the interest rate on saving is ambiguous because the substitution effect tends to cause saving to rise while the income effect may cause saving to fall. As we said in Chapter 4, we take the normal case to be one in which a rise in interest rates is associated with a rise in saving.

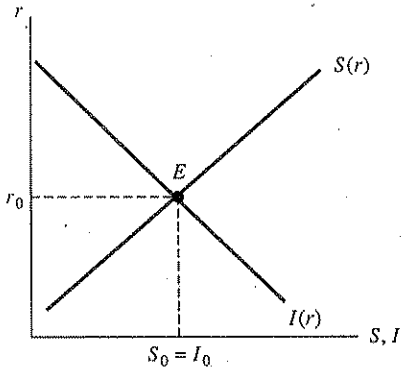
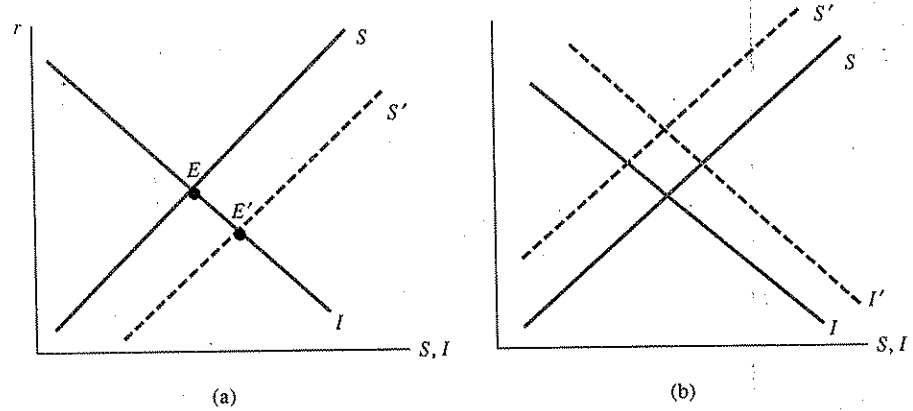


Figure 6-1
Saving, Investment, and the Interest Rate in a Closed Economy

fects of a temporary increase in output resulting from a favorable supply shock—a bountiful harvest, for example. Households will want to save more at any given interest rate, so that the saving schedule will shift to the right, as shown in Figure 6-2a. The investment schedule will not shift, however, if the output change is strictly temporary. As long as the future production function remains unchanged, the desired capital stock in the future also remains unchanged. Thus, the I schedule will not shift. The result of the temporary output increase, therefore, is a fall in interest rates and an increase in current saving and investment, as the equilibrium shifts from E to E' in Figure 6-2a.

Now let us consider the effects of an anticipated future increase in income, one that also shifts upward the marginal productivity of capital in the future. In this case, current saving will tend to fall, as households borrow against their higher future income; investment will tend to increase as well, to take advantage of the higher marginal productivity of capital. The result is shown in Figure 6-2b, as a leftward shift in the saving schedule and a rightward shift in the investment schedule. We can say with certainty that interest rates will rise, while overall saving and investment might rise or fall.

Figure 6-2
Effects of Economic Shocks on Saving and Investment in a Closed Economy



Most economies in the world are not closed, however, so the assumption that a country's saving and investment must always balance is not very useful. Residents in one country can generally lend or borrow from the rest of the world, and thereby build up claims or liabilities vis-à-vis residents in other countries. Thus, saving and investment analysis must be expanded to take into account the international flows of financial assets.

Let B^* be the net claims of a country's residents on residents in the rest of the world. (We use the asterisk in general to denote a "foreign variable." The asterisk here stresses that B^* is a claim on foreign output.) B^* is sometimes called the country's *net international investment position*, or the *net foreign asset position*. It may be thought of as an asset in the form of a bond (hence, the notation), though in fact claims against the rest of the world can be held in many forms: bonds, money, equities, and so on. B^* measures the assets of national residents vis-à-vis foreigners, *minus* the liabilities vis-à-vis foreigners. When B^* is positive, the country is a *net creditor* of the rest of the world, and when B^* is negative the country is a *net debtor* of the rest of the world.

We define the country's current account (CA) as the change in its net financial asset position with respect to the rest of the world:

$$\text{CA} = B^* - B^*_{-1} \tag{6.1}$$

Note that current account surpluses imply an accumulation of foreign assets or a reduction in foreign liabilities. Deficits imply a decumulation of foreign assets or an increase in foreign liabilities.

Equation (6.1) tells us that the current account in this period (CA) is the change in net foreign assets, which we denote by B^*, between this period and the *previous* period (denoted by the subscript $_{-1}$). Notice that the level of B^* in a given period is a result of past current account surpluses and deficits. Starting from an initial year (arbitrarily denoted year 0), the net international investment position of a country in year t (B^*_t) is equal to B^*_0 plus the sum of current accounts in the years between 0 and t:

$$B^*_t = B^*_0 + CA_1 + CA_2 + \cdots + CA_t \tag{6.2}$$

In many countries, especially in the developing world, B^* is a negative number, because the countries' current accounts have been negative for a long time. The situation of the heavily indebted developing countries has generated much attention and discussion during the past decade and has become known as the Third World debt crisis. We analyze this crisis in detail in Chapter 22.

Table 6-1 presents the evolution of the U.S. current account and its net foreign asset (NFA) position since 1970.[3] The NFA measures the creditor or debtor status of the United States vis-à-vis the rest of the world; that is, it measures the balance of total foreign assets *minus* total foreign liabilities.

Note that the current account deficits of the United States during the 1980s have transformed this country from the major international creditor country to the world's biggest net debtor. Indeed, by the end of 1988 the

[3] According to current usage, we will treat the terms "net international investment position" and "net foreign asset position" as synonyms.

TABLE 6-1

THE CURRENT ACCOUNT AND THE NET INTERNATIONAL INVESTMENT IN THE UNITED STATES, 1970–1989
(BILLIONS OF CURRENT DOLLARS)

Year	Current Account Balance	Net International Investment Position
1970	2.3	58.6
1971	−1.4	56.1
1972	−5.8	37.1
1973	7.1	61.9
1974	2.0	58.8
1975	18.1	74.6
1976	4.2	82.6
1977	−14.5	72.4
1978	−15.4	76.7
1979	−1.0	95.0
1980	1.1	106.3
1981	6.9	140.9
1982	−5.9	136.7
1983	−40.1	89.0
1984	−99.0	3.3
1985	−122.3	−111.4
1986	−145.4	−267.8
1987	−162.3	−378.3
1988	−128.9	−532.5
1989	−110.0	—

Source: Economic Report of the President, 1991, *(Washington, D.C.: U.S. Government Printing Office, 1991), Tables B-101 and B-102, various issues.*

United States had accumulated over $500 billion of net foreign liabilities.[4] This is more than three times the debt of Brazil or Mexico, the largest developing country debtors. In spite of its size, however, the U.S. problem

[4] We should acknowledge at this point that the data underlying Table 6-1 have many measurement problems. Some authors have argued that the United States did not really become a net debtor during the 1980s because the value of U.S. assets abroad is much higher than the official data indicates. For one thing, U.S. investments abroad have been measured traditionally at historic cost. Other kinds of errors in the data do tend to understate U.S. debts to foreigners, however. While we cannot be sure of the overall level of the net U.S. debt, it is surely the case that the U.S. net international investment position fell sharply in the 1980s, moving from a large surplus to a much smaller surplus or to a deficit. Indeed, a recent estimate based on the market value of investments revised the U.S. NIIP upward to −$268 billion in 1989, still a sizable number, but much less than the −$532 billion shown in the table.

is of a smaller magnitude relative to income; the net international liabilities of the United States represent only about 10 percent of its GDP, while Mexico's net debt is well over 50 percent of its GDP.

Note also that the current account is not exactly equal to the change in net foreign assets. A variety of factors account for this discrepancy: unrecorded capital flows,[5] which sometimes show up in the balance of payments under the category "errors and omissions," valuation changes on existing assets and liabilities which affect the net asset position but not the current account, expropriations of foreign assets, and defaults on international debt.

To show how the current account is related to saving and investment, we must first look back at the budget constraint of an individual household. Recall from equation (5.5) of the previous chapter that for a given household i, the change in financial assets is equal to the difference between the saving and investment of the household:

$$B^i - B^i_{-1} = Q^i + rB^i_{-1} - C^i - I^i \tag{6.3}$$

Now, write the household's income as $Y^i = Q^i + rB^i_{-1}$, and use the fact that saving S^i equals $Y^i - C^i$ to find

$$B^i - B^i_{-1} = S^i - I^i \tag{6.4}$$

An individual household can hold claims against other domestic households or against foreigners. If we add up all the net claims of households to get the net asset position of the entire economy, the claims that are owed by one household to another net out of the sum of all households, since claims between households are assets for some households but equal liabilities for others. What remains are the net claims of the economy against the rest of the world, which we have denoted B^*. Thus, in adding (6.4) over all households we find for the economy as a whole

$$B^* - B^*_{-1} = Q + rB^*_{-1} - C - I \tag{6.5}$$

Once again substituting $Y = Q + rB^*_{-1}$ (GNP = GDP + net income from abroad), and $S = Y - C$, we can now write

$$B^* - B^*_{-1} = S - I \tag{6.6}$$

Equation (6.6) can be interpreted quite simply. Since it can be rewritten as $S = I + (B^* - B^*_{-1})$, it tells us that domestic saving can be used for two things: domestic investment (I) or net foreign investment ($B^* - B^*_{-1}$).

Equations (6.1) and (6.6) make it clear that the current account can be expressed as the difference between national saving and investment:

$$CA = S - I \tag{6.7}$$

As long as domestic residents can borrow and lend from foreign residents, domestic saving and investment do not have to be equal. The difference between saving and investment is precisely measured by the current account balance. Clearly, in a closed economy, the current account concept is irrele-

[5] In industrialized countries, these unrecorded capital flows are known by the elegant technical term *portfolio reallocations*. In the developing world, these flows are called *capital flight*, a term that has a distinctly negative connotation. We analyze the issue of capital flight in Chapter 22.

TABLE 6-2

SAVING, INVESTMENT, AND THE CURRENT ACCOUNT IN THE UNITED STATES, 1950–1990
(AS PERCENTAGE OF GDP)

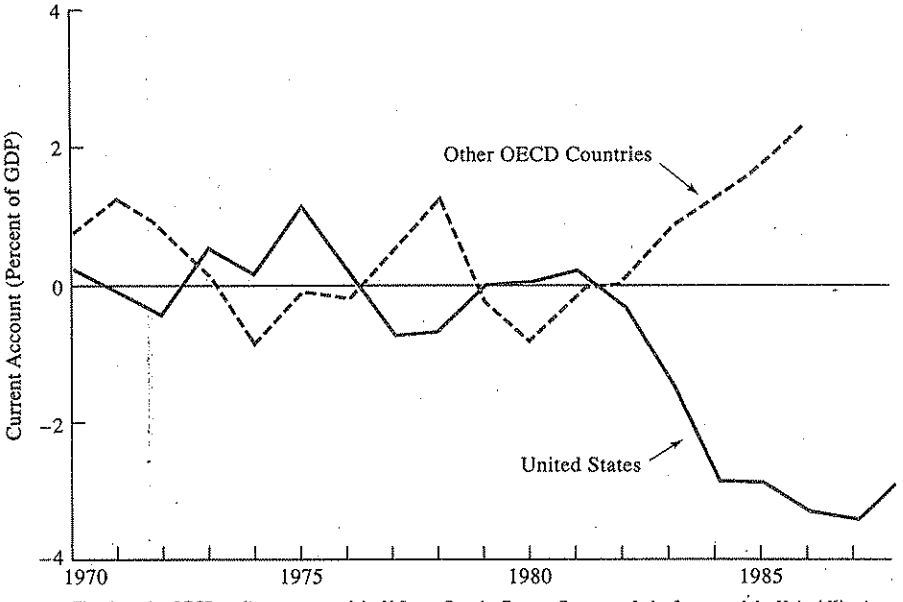
Year	Gross Saving	Gross Private Domestic Investment	Saving − Investment	Balance on Current Account	Statistical Discrepancy
1950–59	16.2%	16.3%	−0.1%	0.1%	0.2%
1960–69	16.4	15.6	0.8	0.5	−0.3
1970–79	16.9	16.7	0.2	0.0	−0.2
1980	16.6	16.3	0.3	0.1	−0.2
1981	17.4	17.2	0.2	0.3	0.1
1982	14.3	14.4	0.0	−0.2	−0.2
1983	13.8	15.0	−1.2	−1.3	−0.2
1984	15.3	17.8	−2.6	−2.8	−0.2
1985	13.4	16.2	−2.8	−2.8	−0.1
1986	12.5	15.7	−3.2	−3.2	0.0
1987	12.3	15.6	−3.3	−3.2	0.1
1988	13.3	15.5	−2.2	−2.6	−0.4
1989	13.5	14.9	−1.5	−2.1	−0.6
1990p	12.1	13.7	−1.6	—	—

p = preliminary.
Source: Economic Report of the President, 1991 *(Washington, D.C.: U.S. Government Printing Office, 1991), Tables B-28 and B-102.*

vant. In an economy completely isolated financially from the rest of the world (no net claims), the current account is always zero.

Table 6-2 presents the time series of saving, domestic investment, and the current account as a percentage of GDP for the United States in the period 1950–1990.[6] Notice that in the 1950s, 1960s, and 1970s the United States consistently experienced a current account surplus. This situation was sharply reversed in the 1980s. During 1981–1990, the average current account deficit was about 2 percent of GDP. Interestingly, the current account decline in the 1980s was due to a sharp fall in the national saving rate rather than to a rise in domestic investment. In fact, domestic investment

[6] We should point out one data distortion in Table 6-2. In the United States, gross saving is measured as the sum of private saving and the public surplus. The public surplus is government saving minus government investment. Thus, government investment is subtracted from gross saving rather than being included in total investment, which includes only private capital formation. Thus, for this reason, the data understate both saving and investment by misclassifying government investment. Nonetheless, even if government investment were properly classified, the direction of change in recent years (toward lower national saving and a lower current account balance) would remain.



The six major OECD trading partners of the U.S. are Canada, France, Germany, Italy, Japan, and the United Kingdom. The figure shows the sum of their current accounts, measured in dollars, as a percentage of their combined GDP, also measured in dollars.

Figure 6-3
The Current Account in the United States vis-à-vis Other Industrialized Countries

(From International Monetary Fund, International Financial Statistics.*)*

also declined in this period, but the drop in saving was even more pronounced. (In turn, most of the fall in national saving is due to the behavior of the public sector, a point we study in greater detail in the next chapter, when we analyze formally the role of the government sector.)

As the current account balance of the United States declined during the 1980s, the rest of the world had to be running a current account surplus vis-à-vis the United States. After all, the world as a whole is a closed economy. Figure 6-3 depicts the behavior of the current account in the United States vis-à-vis the rest of the member countries in the Organization for Economic Cooperation and Development (OECD).[7] The graph clearly shows the negative relationship between the U.S. current account and that of the rest of the OECD countries. As the U.S. CA *deficit* increased to over 3 percent of GDP, the CA *surplus* among the other OECD members reached over 2 percent of their combined GDP.

Of course, the *average* for the other 23 OECD member countries hides important differences in individual behavior. Indeed, this average is strongly influenced by the vast current account surpluses in Japan and West Germany as well as the relative weight of their economies within the OECD. Table 6-3 shows a breakdown of the current account behavior for the United States

[7] The OECD is an association of 24 major industrialized countries. These are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

TABLE 6-3

THE CURRENT ACCOUNT IN THE UNITED STATES AND ITS MAJOR TRADING PARTNERS, 1980–1989

Year	United States	Canada	France	Germany	Italy	Japan	United Kingdom
				Billions of U.S. Dollars			
1980	1.8	−1.0	−4.2	−14.0	−10.0	−10.8	7.5
1981	6.9	−5.1	−4.8	−3.4	−9.7	4.8	14.5
1982	−7.0	2.2	−12.0	5.0	−6.4	6.9	8.0
1983	−44.3	2.5	−5.2	5.4	1.4	20.8	5.8
1984	−104.2	2.0	−0.9	9.7	−2.5	35.0	2.6
1985	−112.7	−1.4	0.0	17.0	−3.5	49.2	4.7
1986	−133.2	−7.6	2.4	40.1	2.9	85.8	0.1
1987	−143.7	−7.0	−4.4	46.1	−1.6	87.0	−7.4
1988	−126.6	−8.3	−3.5	50.5	−5.4	79.6	−26.7
1989	−105.9	−16.6	−4.3	55.7	—	56.8	−34.1
				Percentage of GDP			
1980	0.1	−0.4	−0.6	−1.7	−2.2	−1.0	1.4
1981	0.2	−1.7	−0.8	−0.5	−2.4	0.4	2.8
1982	−0.2	0.7	−2.2	0.8	−1.6	0.6	1.7
1983	−1.3	0.8	−1.0	0.8	0.3	1.8	1.3
1984	−2.8	0.6	−0.2	1.6	−0.6	2.8	0.6
1985	−2.8	−0.4	0.0	2.7	−0.8	3.7	1.0
1986	−3.2	−2.1	0.3	4.5	0.5	4.4	0.0
1987	−3.2	−1.7	−0.5	4.1	−0.2	3.6	−1.1
1988	−2.6	−1.7	−0.4	4.2	−0.7	2.8	−3.2
1989	−2.0	−3.0	−0.4	4.7	—	2.0	−4.1

Source: *International Monetary Fund,* International Financial Statistics, *selected issues.*

and its six major OECD trading partners, Canada, France, Germany, Italy, Japan, and the United Kingdom, for the 1980s.

There is yet another way to express the current account. Notice from equations (6.3) and (6.7) that

$$CA = Y - (C + I) \tag{6.8}$$

We define "absorption," A, as the sum of consumption and investment, that is, total spending by the domestic residents,[8] or

$$A = C + I \tag{6.9}$$

[8] Strictly speaking, consumption and investment should be interpreted here to include government consumption and investment. We explicitly introduce the government in our framework in the next chapter.

Therefore, the current account is also the difference between income and absorption:

$$CA = Y - A \tag{6.10}$$

This was an important insight of Sidney Alexander of the Massachusetts Institute of Technology in the early 1950s.[9]

Equation (6.10) has a very intuitive appeal. Countries run current account deficits when they spend (or absorb) more than they earn. This requires them to run down their foreign assets or to increase their net liabilities to the rest of the world.

Thus, a current account deficit occurs when a country "spends beyond its means" (absorption is greater than income) or when it "invests in excess of its own saving." While these two ways of measuring the current account are equivalent, they certainly conjure up different value judgments about a current account deficit. When economists want to complain about a current account deficit, they tend to say that the country is living beyond its means; when they want to defend a current account deficit, on the other hand, they say that the country's investment climate is highly favorable (causing investment in excess of national saving). Of course, a current account deficit is—by itself—neither a good nor a bad thing. The appropriateness of the current account position must be evaluated in terms of the intertemporal prospects facing an economy.

Using the diagram in Figure 6-1, we can readily see how the current account is determined. There we depicted saving as an increasing function of the interest rate and investment as a decreasing function of the interest rate. In the closed economy, the interest rate adjusts to equilibrate saving and investment, as we saw earlier.

Now, let us assume that the economy is open and that in fact its residents can borrow and lend freely at a given world interest rate, which we call r. In effect, we are making the *small-country assumption*, that saving and investment decisions in the home country—whose saving and investment are depicted in Figure 6-4a—do not affect the world interest rate. For a given world r, saving and investment need not be equal in the country, with the gap reflecting the current account deficit or surplus of the country. If the world interest rate is relatively high, say, r_H in Figure 6-4a, saving in the domestic economy will be higher than investment and the country's current account will be in surplus. (The current account surplus is measured by the horizontal difference between the S and I schedules at the rate r_H.) Conversely, if the world interest rate is relatively low, say, r_L, investment will exceed saving in the domestic economy and the economy will be running a current account deficit.

Using this simple framework, we can represent the current account as an increasing function of the interest rate, as shown in Figure 6-4b. At every interest rate, the horizontal difference between the saving and investment schedules in Figure 6-4a measures the current account. By shifting the interest rate, we can draw the curve CA in Figure 6-4b. Notice that the CA schedule is always flatter than the S schedule, because a higher interest rate

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[9] Sidney Alexander, "The Effects of Devaluation on a Trade Balance," *International Monetary Fund Staff Papers*, 1952, pp. 263–278.

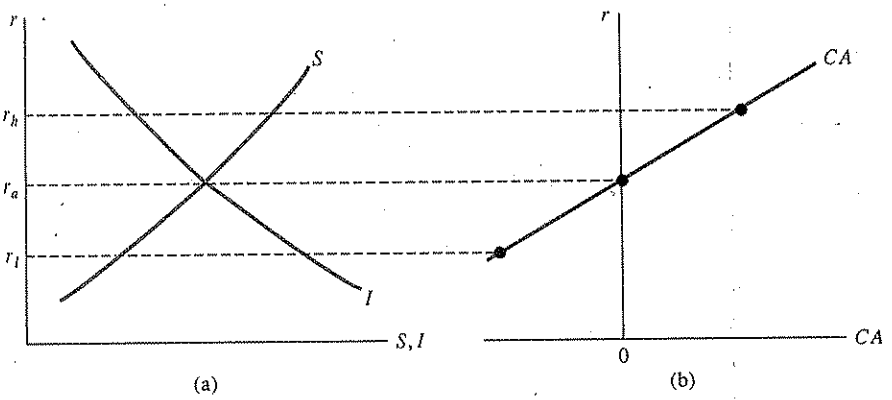

Figure 6-4
Saving, Investment, and the Current Account

not only increases saving but also reduces investment, and both of these effects improve the current account. In a later section, we examine more carefully those factors that are likely to affect a country's current account balance.

6-2 The Current Account and International Trade

So far, we have described the current account without mentioning international trade. This may be surprising, since most of us typically think about the current account as a trade phenomenon, a matter of exports and imports. In truth, there is an intimate link between the saving-investment balance and the export-import balance, a link which leads us to a more subtle understanding of current account imbalances.

When a country absorbs more than it produces ($A > Q$), it is using more resources than are available to it from domestic production alone. A country can do that only by importing goods from the rest of the world. More precisely, the country must import more from the rest of the world than it exports to the rest of the world, so that *on balance* it is receiving real resources from abroad. For this reason, a current account deficit tends to be associated with an excess of imports over exports, and a current account surplus tends to be associated with an excess of exports over imports. Now let us look more closely at this relationship.

For a given amount of total domestic absorption A, the total spending is divided between absorption on domestic goods (denoted A_d) and absorption on imports (denoted IM):[10]

$$A = A_d + IM \tag{6.11}$$

[10] Technically, all goods will be measured in units of the home goods. That is, IM signifies the nominal value of total imports divided by the price index of the domestic output.

At the same time, all goods produced at home must be either sold domestically (in the amount A_d) or exported, X. Thus,

$$Q = A_d + X \tag{6.12}$$

The country's trade balance is measured as the value of exports minus the value of imports ($TB = X - IM$). But since exports are equal to total output minus the portion of it that is consumed domestically ($X = Q - A_d$), we can conclude that

$$TB = X - IM = Q - A_d - IM = Q - A \tag{6.13}$$

Now, with the trade balance equal to output minus absorption, and with the current account equal to income minus absorption, the difference between the trade balance and the current account balance is the net factor payments from abroad (NF). In our model, NF is simply the interest payments on net foreign assets, equal to rB^*_{-1}.[11] Consequently, because CA $= Y - A$, we also can write CA $= Q + rB^*_{-1} - A$. Then, using (6.13), we have

$$\text{CA} = TB + rB^*_{-1} \tag{6.14}$$

Under ordinary circumstances, rB^*_{-1} is small relative to the trade balance, in which case the current account balance and the trade balance are nearly the same. Current account deficits often signal not just an excess of investment over saving, or absorption over income, but also an excess of imports over exports. It is possible, however, to have a current account deficit with a trade-balance surplus (or vice versa), if the earnings on the net foreign assets are relatively large. In Box 6-1, we examine the current account balances of several countries to see how the overall balances actually depend on trade, interest payments, and other items.

To summarize, there are four different ways to describe the current account: (1) as the change in net foreign assets (CA $= B^* - B^*_{-1}$), (2) as national saving net of investment (CA $= S - I$), (3) as income minus absorption (CA $= Y - A$), and (4) as the trade balance plus net factor payments from abroad (CA $= X - IM + NF$).

In past years, some economists have argued as if these different definitions hinted at different "theories" of the current account, including an intertemporal theory that stresses saving and investment; an "elasticity approach" that stresses factors determining imports and exports; an "absorption approach" that stresses the determinants of absorption relative to income; and so forth. This debate among the various schools of thought has been fruitless, however. All formulations of the current account are equally true, and all are linked together by simple accounting identities. There is no

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[11] In real life, though not in our simplified model, there are some other items that cause the current account and the trade balance to differ. For example, the receipt of foreign aid from abroad raises the current account relative to the trade balance, though the foreign aid is a form of transfer payment and not a receipt of income on foreign assets. A complete breakdown of the difference in the two balances is shown in Table 6-4. Note that the difference between the trade balance and the current account balance includes two categories: "other goods, services, and income" and "unilateral transfers." The "other goods, services, and income" category includes income received on net foreign assets (the subcategory "interest and dividends"), as well as receipts on travel (tourism), workers' remittances, and some other items. The "unilateral transfer" category includes foreign aid as well as transfers from the private sector.

Box 6-1
What Is Hidden by a Summary Current Account Statistic?

Cross-country comparisons of current account behavior, like those shown in Table 6-3, often do not go beyond the most aggregated level: the ratio of the current account to GDP. But while this summary statistic conveys some important information, it also hides quite a bit. Is a given current account deficit due to high investment levels or to low saving? Is the explanation for the deficit found in a trade deficit or in high interest payments on foreign debt? The answers vary substantially across countries, a point that shows up clearly in Table 6-4. (For a discussion of balance-of-payments accounting, see also the appendix to this chapter.)

Consider the current account balances of various countries in 1989. Notice that in the United States the current account deficit is almost completely accounted for by the trade deficit, with the rest of the current account close to equilibrium. In Japan, a major trade surplus is the principal cause of the current account surplus. Behind these figures, the country runs an important deficit on services, as the Japanese have grown fond of traveling abroad. Of course, this situation is not static. The United States used to have a huge surplus in services due to high profit remittances and interest payments on U.S. loans abroad. Persistent current account deficits have deteriorated its net foreign asset position, however, as we saw in Table 6-1, and this has obviously reduced the net income from capital. Japan has persistently accumulated net foreign assets during the period, and thus it presents the opposite case.

For major debtors, such as Brazil in the table, the current account shows a relatively small surplus of $4.1 billion despite a massive trade surplus of $19.1 billion. Huge interest payments on foreign debt account for most of the discrepancy. Because of this factor, in 1988 Brazil had a current account deficit together with a huge trade surplus. Among service payments, workers' remittances are a very important source of foreign exchange on the current account for countries such as Turkey, and, to a lesser extent, the Philippines. Notice also that workers' remittances represent a substantial outflow of funds from the United States and Japan, as foreign workers attracted by high wages in the United States send money back to their families in their native countries. In other countries such as Spain and Thailand, tourism is a major foreign-exchange earner. Indeed, tourism is the most important source of foreign exchange in Spain, with a net contribution of over $13 billion in 1989, or about 30 percent of the country's exports.

A final group of countries get much of their foreign exchange on current account through unilateral transfers, that is, gifts from other nations. China, India, Indonesia, Bangladesh, Egypt, and Israel collect the most dollars through official development assistance, as shown in Table 6-5. However, if the ranking is made as a proportion of the recipient country's GDP, the top 11 earners of grants are in Africa.

TABLE 6-4

THE COMPOSITION OF THE CURRENT ACCOUNT BALANCE FOR SELECTED COUNTRIES, DECEMBER 1989 (MILLIONS OF U.S. DOLLARS)

	United States	Japan	Brazil*	Mexico	Turkey	Philip-pines	Spain	Thai-land
Trade balance	−114,870	76,890	19,168	−645	−4,201	−2,598	−24,495	−2,948
Exports	360,460	269,550	33,773	22,765	11,771	7,821	43,301	19,824
Imports	−475,330	−192,660	−14,605	−23,410	−15,972	−10,419	−67,797	−22,772
Other goods, services, and income	18,680	−15,620	−15,118	−5,153	4,672	661	10,370	250
Travel	−550	−19,350	−588	−548	1,992	392	13,121	3,004
Interest and dividends	7,840	19,690	−12,122	−8,010	−1,792	−1,395	−3,418	−911
Workers' remittances	−910	—	−15	321	3,063	358	1,415	—
Other	12,300	−15,960	−2,393	3,085	1,408	1,306	−748	−1,843
Unilateral transfers	−13,850	−4,280	109	351	495	472	3,192	243
Official transfers	−13,430	−3,290	−13	156	423	357	1,444	197
Other	−420	−990	122	195	72	115	1,748	46
Current account balance	−110,040	56,990	4,159	−5,447	966	−1,465	−10,933	−2,455

* *December 1988.*
Source: *International Monetary Fund,* Yearbook, *Balance of Payments Statistics, 1990.*

TABLE 6-5

COUNTRIES THAT RECEIVE EXTENSIVE OFFICIAL DEVELOPMENT ASSISTANCE, 1989

Amount (millions of US$)		As a % of GDP	
China	$2,227	Mozambique	59.2%
India	1,874	Somalia	38.9
Indonesia	1,830	Tanzania	32.0
Bangladesh	1,791	Lesotho	26.0
Egypt	1,578	Malawi	24.9
Israel	1,192	Chad	23.5
Pakistan	1,119	Mali	22.6
Kenya	967	Lao PDR	22.5
Tanzania	918	Mauritania	19.4
Philippines	831	Burundi	18.6
Sudan	760	Central African Republic	17.1
Mozambique	759	Nepal	16.0

Source: *World Bank,* World Development Report 1991 *(New York: Oxford University Press, 1991), Table 20.*

separate "intertemporal theory" or "trade theory" of the current account. Each of the approaches, properly specified, must lead one back to the same more basic considerations.

6-3 THE DETERMINATION OF THE CURRENT ACCOUNT

In this section we study at greater length the factors that influence the current account balance in a small country facing a given world interest rate. We focus on the effects of different shocks that may hit the economy—changes in world interest rates, fluctuations in the terms of trade, and investment movements.

World Interest Rates

The first factor of importance is the world interest rate itself. Note in Figure 6-4 that as the world interest rate rises from r_a to r_b, domestic investment falls, saving rises, and the current account moves to a surplus. Thus, there is a positive relationship between the current account for the small open economy and the world interest rate at which its residents borrow and lend.

Remember that current account changes have effects on both financial and trade flows. Suppose for a moment that the economy starts from current account balance at point r_a in Figure 6-4. A rise in interest rates makes the current account go to a surplus, as consumers save more (consume less) and invest less out of the fixed amount of national income. The decline in domes-

tic absorption means that imports fall and that a greater amount of domestic production is available for export. Thus, the shift to current account surplus also implies an increase in net exports, a *trade* phenomenon. The *financial* counterpart of the improvement in the trade balance is the accumulation of net foreign assets, B^*.

Investment Shocks

Suppose that investment prospects improve in a small economy that faces a given world interest rate. In Figure 6-5, this is represented as a shift to the right in the investment schedule. If the economy started from equilibrium at point A, the current account moves to a deficit of magnitude AB. In Figure 6-2, the effect of the investment shock on a closed economy, was mainly to raise interest rates. Here, in an open economy, the domestic interest rate is given by the world rate. Thus, an investment surge has a deteriorating effect on the current account, while interest rates remain unchanged.

A good example of such a phenomenon took place in Norway after the major world oil price increase in 1973. The oil shock made it highly profitable

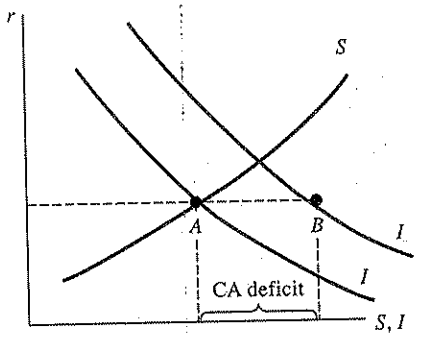

Figure 6-5
The Current Account and Improved Investment Opportunities

to invest in oil exploration and development in the North Sea. Norway's investment-to-GDP ratio, which had averaged 28 percent during 1965–1973, increased by a full 10 points to 38 percent during 1974–1978. Most of this surge in capital formation went to energy and energy-related ventures, including the oil and gas pipeline between Norway and West Germany. Because the country's saving rate changed little (and even fell a bit), however, the result of this investment surge was a massive current account deficit, which reached almost 15 percent of GDP in 1977.[12]

Output Shocks

In many countries, output occasionally drops temporarily because of unfavorable weather conditions or other exogenous shocks to a major sector of the economy. Take the case of an agricultural country hit by a severe

[12] For an analysis of current account behavior in both industrialized and developing economies, see Jeffrey Sachs, "The Current Account and Macroeconomic Adjustment in the 1970s," *Brookings Papers on Economic Activity*, 1: 1981.

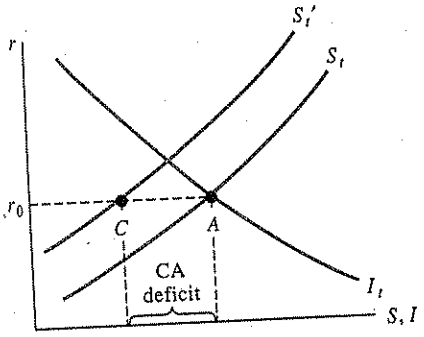

Figure 6-6
The Current Account and a Transitory Output Decline

drought, or a Caribbean country hit by a hurricane. The life-cycle theory of saving predicts that people want to maintain a stable consumption level despite the temporary decline in output, and thus aggregate saving will decline in response to the shock. For a given amount of investment, the current account will deteriorate, as Figure 6-6 shows. If the country started from equilibrium at point A, the current account deficit after the temporary shock is AC in the graph. (Remember from Figure 6-2 that in response to a temporary adverse shock, the closed-economy response is a rise in interest rates, and some decline in domestic investment.)

If the shock is permanent, however, then saving should not fall significantly in response to the shock. Instead, it makes more sense to reduce consumption by the amount of the fall of output when the decline in output is permanent. Thus, with a permanent decline in output, the current account does not shift into deficit. (In fact, if investment demand falls in response to some long-term adversity, the current account might actually turn to surplus despite the decline in current output.)

Terms-of-Trade Shocks

The terms of trade, which will be denoted as TT, is the price of a country's exports relative to the price of its imports ($TT = P_X/P_M$). Because countries export more than a single good, P_X should be interpreted as a price index for all export goods. The same applies to P_M. A crucial aspect of terms-of-trade changes is that they cause income effects for the country, effects that are akin to shifts in national output. A rise in the terms of trade means that P_X has gone up relative to P_M. With the same physical quantity of exports, the country can now import more goods. The country's real income rises because of the greater availability of imports.[13]

A transitory rise in the terms of trade implies a transitory increase of income relative to permanent income. Consequently, aggregate saving in the country will tend to rise because of consumption-smoothing behavior. Start-

[13] A simple measure of the percentage rise in real income caused by the change in TT is found as follows: multiply the percentage change in the terms of trade by the share of imports in GNP. Thus, if the terms of trade improves by 10 percent, while the import-GNP ratio is 20 percent, the terms of trade improvement is akin to a 2 percent (20 percent times 0.10) improvement in real national income.

ing from equilibrium, the current account will tend to move to a surplus. Following a permanent rise in the terms of trade, however, households will adjust their real consumption upward by the amount of the terms-of-trade improvement. Saving rates do not necessarily rise in this case, and the current account does not necessarily move toward or into surplus.

Colombia, for example, has experienced sizable temporary income fluctuations when the price of its major export, coffee, has changed relative to other prices. In the late 1970s, a major rise in the relative price of coffee had significant effects throughout the economy. The macroeconomic result was true to the theory. Domestic saving went up as a proportion of GDP and the current account improved significantly.[14]

The theory of the current account, therefore, offers an important prescription for the "optimal" response to fluctuations in the terms of trade. If a change in the terms of trade is temporary, it should be absorbed by changes in the current account; that is, a terms-of-trade improvement should result in a surplus, while a terms-of-trade decline should lead to a deficit on the current account. If a change in the terms of trade is permanent, households adjust their consumption levels in response to the shocks so that saving rates do not fluctuate. Permanent shifts in the terms of trade should therefore have little effect on the current account (except as the *TT* shock might affect investment spending).

This basic wisdom is sometimes encapsulated in the phrase "finance a temporary shock; adjust to a permanent shock." The term "finance" here means to borrow or lend—to run current account surpluses or deficits—in response to transitory disturbances; the term "adjust" means to vary the consumption level up or down in response to permanent *TT* shocks. This general principle is a fundamental guidepost for the lending policies of the International Monetary Fund (IMF). The IMF was formed immediately after World War II to assist countries with external payments difficulties and to promote international stability in the monetary system. In 1962, the IMF created the Compensatory Financing Facility (CFF), a loan fund designed explicitly to make loans to countries suffering *temporary* shortfalls in export earnings. To qualify for a CFF loan, the country must demonstrate in precise detail both that it has suffered a decline in export earnings and that the shortfall is temporary. If the shortfall appears to be permanent, then the IMF does not make a CFF loan, and instead advises the country to cut back on spending levels to match the shortfall in its exports.

The idea of financing a temporary shock but adjusting to a permanent shock represents both a "normative" theory (what *should* happen) and a "positive" theory (what *will* happen) of the current account. But, as we shall see, positive theory sometimes falls short of predicting what actually happens to the current account. The positive theory of the current account depends on various assumptions: that economic agents are rational, intertemporal optimizers; that they are able to distinguish temporary from permanent shocks; and that they are able to borrow and lend freely in response to those shocks. We shall soon see that these assumptions may well be violated

[14] Sebastian Edwards has studied this interesting experience in his article "Commodity Export Prices and the Real Exchange Rate in Developing Countries: Coffee in Colombia," in S. Edwards and L. Ahamed, eds., *Economic Adjustment and Exchange Rates in Developing Countries* (Chicago: University of Chicago Press, 1986).

in real economies. In particular, when governments act as borrowers and lenders, they often fail to act as farsighted intertemporal maximizers.

Thus, when many developing countries enjoyed large terms-of-trade improvements at the end of the 1970s, they failed to run current account surpluses as theory predicted they would. Instead, the governments in these countries often acted as if the terms-of-trade improvements were permanent instead of transitory, and they raised spending by the full amount of the real income gain, even though the gain was likely to be short-lived. Mexico, for example, spent the huge windfall in oil export earnings that arose when oil prices shot up during 1979 and 1980. Once the terms of trade reversed in the early 1980s, Mexico and other such governments found themselves with unsustainably high spending levels and big political difficulties in cutting spending back down to manageable levels. Often it took a deep crisis—economic and political—before government spending levels were cut back to sustainable levels. (We will discuss some of these adjustment problems in the next chapter, and again in Chapter 22, when we analyze the developing country debt crisis.)

6-4 A Country's Intertemporal Budget Constraint

We have seen that personal saving and investment decisions in a particular period influence someone's future path of consumption and income. A person who borrows today must consume less than his or her income in the future in order to repay the loan. Similarly, the levels of national saving, investment, and the current account influence the future path of consumption and income for the economy as a whole.

Suppose that a natural disaster makes output fall temporarily in the current year. A decline in the country's output translates into lower income for the average household. As individual households attempt to smooth their consumption by borrowing against higher future income, aggregate saving declines, and the national economy experiences a deterioration in the current account. The country then borrows from abroad, or at least runs down its existing stock of foreign assets. In the future, it will have to consume less than income in order to repay the debts incurred today.

An example of this phenomenon was Ecuador in 1987. When a major earthquake destroyed 35 kilometers of the country's oil pipeline, it left oil production interrupted for five months. Oil is Ecuador's principal export, and the earthquake produced a sharp but temporary decline in the country's income. Consequently, national saving collapsed and the current account reached a deficit of about 12 percent of GDP. Following that crisis and the foreign borrowing that it provoked, Ecuador will have to restrict consumption to service the debts incurred during that year.

The Intertemporal Budget Constraint in the Two-Period Model

We can also examine the country's intertemporal budget constraint formally using the two-period model. Suppose, as we did at the household level, that the country starts with no foreign assets ($B_0^* = 0$). In that case, the value of B^* in period 1 (B_1^*) is equal to the current account surplus in the first period:

$$B_1^* = Q_1 - C_1 - I_1 = CA_1 \qquad (6.15)$$

The change in net foreign assets from the first to the second period is the current account balance in the second period:

$$B_2^* - B_1^* = Q_2 + rB_1^* - C_2 - I_2$$

or

$$B_2^* = (1 + r)B_1^* + Q_2 - C_2 - I_2 \tag{6.16}$$

But under the rules of a two-period model, the country must end with no net foreign assets ($B_2^* = 0$), and it undertakes no investment in the second period ($I_2 = 0$). Therefore, we can combine equations (6.15) and (6.16) to obtain

$$C_1 + \frac{C_2}{(1 + r)} = (Q_1 - I_1) + \frac{Q_2}{(1 + r)} \tag{6.17}$$

Thus, we see that what was true for individual households is also true for the nation as a whole. Countries too are bound by a *national intertemporal budget constraint:* the discounted value of aggregate consumption must be equal to the discounted value of national production net of investment.

Take a simple case where there are no attractive investment opportunities. Under these conditions, the economy's only decision is how much to consume today and how much to save. In Figure 6-7, the country's budget constraint is shown by the line CC. For all the points on CC, $C_1 + C_2/(1 + r) = Q_1 + Q_2/(1 + r)$. To the southeast of point Q, the economy would be running a current account deficit in the first period, with $C_1 > Q_1$. To the northwest of point Q, the country would be running a current account surplus. The point where the economy will actually locate along the budget line depends on the preferences of the society.

Three fundamental conclusions emerge from this analysis:

1. If consumption is greater than output in the first period ($C_1 > Q_1$), then consumption has to be smaller than output in the second period ($C_2 < Q_2$). The reverse is also true: if $C_1 < Q_1$, then $C_2 > Q_2$.
2. Since, in the absence of investment, the trade-balance surplus is the difference between output and consumption ($TB_1 = Q_1 - C_1$), then the trade deficit in the first period must be matched by a trade surplus in the second period.

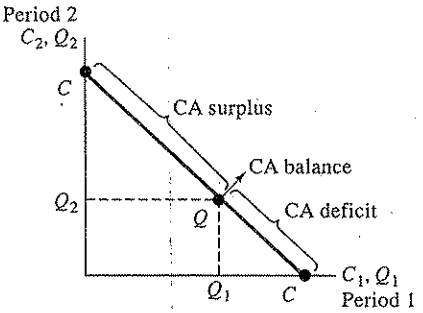

Figure 6-7
The Country's Budget Constraint and the Current Account

3. If the country runs a current account deficit in the first period, thereby incurring foreign debt, it must run a surplus in the future, in order to repay the debt. Similarly, if it runs a surplus in period 1, it must run a deficit in period 2.

Algebraically, we can state the country's intertemporal budget constraint in several analogous ways. First, we have seen that the discounted value of consumption must be equal to the discounted value of output net of investment. Second, we can rearrange terms in equation (6.17) to describe it in terms of the trade balance in the two periods. Since $TB_1 = Q_1 - C_1 - I_1$ and $TB_2 = Q_2 - C_2$, it is easy to verify that the discounted value of the trade balances has to be equal to zero:

$$TB_1 + \frac{TB_2}{(1 + r)} = 0 \tag{6.18}$$

This means that a trade deficit in the first period must be balanced by a trade surplus in the second period of equal present value.

The third way of expressing the country's intertemporal budget constraint is in terms of the current account. Since an economy's current account is equal to the economy's accumulation of net foreign assets, we have $CA_1 = B_1^* - B_0^*$ and $CA_2 = B_2^* - B_1^*$. Assuming that the country starts with no net foreign assets ($B_1^* = 0$) and ends with no assets ($B_2^* = 0$), we must have

$$CA_1 + CA_2 = 0 \tag{6.19}$$

Before moving on, we should stress one key qualification. This analysis assumes that a debtor always honors its debts, and the budget constraint is derived under that assumption. There are cases, of great importance, in which a debtor either cannot or chooses not to repay debts incurred in an earlier period. In a domestic economy, debtors sometimes go bankrupt and are unable to repay. In the international economy, where enforcement of contracts is more difficult, debtors sometimes choose not to repay. In these cases, the budget constraint may not be as stringent as most arguments suggest. (We return to this issue at the end of the chapter, and again in Chapter 22, when we discuss the developing country debt crisis.)

Let us consider a specific illustration of the intertemporal budget constraint to clarify concepts further. Suppose that the saving and consumption preferences of individual households lead to a particular choice of consumption in the CC schedule so that, say, $C_1 < Q_1$ for the economy as a whole. This situation is represented in Figure 6-8, and the appropriate balance-of-payments accounts are shown in Table 6-6. The horizontal distance between Q_1 and C_1 measures the current account surplus and the trade-balance surplus in period 1. Notice that there is no difference between the two measures in this case. Why? Because the country starts with no net foreign assets.

Domestic households will be lending, on aggregate, an amount $B_1^* = Q_1 - C_1$ to the rest of the world. This capital outflow exactly balances the current account surplus. In the second period, the country consumes $C_2 > Q_2$. The current account is in deficit while there is a capital inflow.

It is worthwhile to mention how these transactions would be recorded in the balance-of-payments accounts kept by the government. (A detailed description of balance-of-payments accounting is given in the appendix to

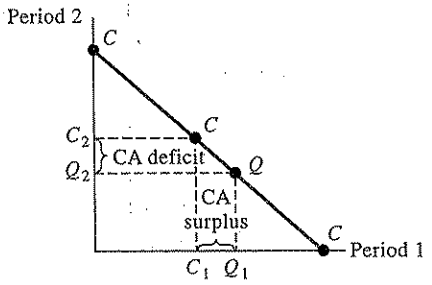

Figure 6-8
The Budget Constraint and a Contemporary Current Account Surplus

this chapter.) The accounting of the balance of payments for this hypothetical country will look like the schedule shown in Table 6-6. We need to introduce here just one new point in order to proceed. A capital outflow is termed, by accounting convention, to be a deficit in capital account of the balance of payments. (And a capital inflow is termed, by accounting convention, to be a surplus in the capital account of the balance of payments.) This means that the current account and the capital account automatically add to zero, as shown in the table.

The Intertemporal Budget Constraint with Many Periods

So far we have derived the intertemporal budget constraint in a two-period framework, but it is easy to extend the analysis to many periods. For T periods, with $T > 2$, we simply derive expressions that are analogous to equations (6.17), (6.18), and (6.19), showing that the discounted value of consumption must equal the discounted value of output net of investment, that the present discounted value of trade balances must equal zero, and that the current account balances between $t = 0$ and $t = T$ must sum to zero.

The extensions from a two-period model to a T-period model are rather straightforward. A new subtlety is added, however, in the (quite realistic!) case that there is no known final period T at which all loans must be paid off. If time just goes on without a final date, does this mean that a country can

TABLE 6-6

BALANCE-OF-PAYMENTS ACCOUNTING IN THE TWO-PERIOD MODEL

	Period 1	Period 2
Current account	$Q_1 - C_1$	$-(Q_1 - C_1)$
Trade balance	$Q_1 - C_1$	$-(1 + r)(Q_1 - C_1)$
Service account	0	$r(Q_1 - C_1)$
Capital account	$-(Q_1 - C_1)$	$(Q_1 - C_1)$
Total (of current account and capital account)	0	0

borrow *any* amount from the rest of the world, without concern for repayments, knowing that it can always simply borrow more in the future to repay any past debt? The answer is no. The international capital markets will still require that the country live within its means, in that *no lender will lend so much to a country for which the only way to repay is to borrow the amount due each period.*

A scheme in which a borrower takes on too much debt (to increase current consumption, for example), and then plans to repay it by borrowing the money needed for debt servicing, is known as a *Ponzi scheme.*[15] Consider what happens in such a scheme. Suppose the borrower owes a debt D. When the debt D comes due, the borrower owes $(1 + r)D$. If it takes a new loan equal to $(1 + r)D$ to pay off the old lender, it now owes a larger amount to the new lender. In the next period, the borrower will have to pay $(1 + r)^2D$, and again, it plans to borrow this larger amount to make the repayment. In the following period, the borrower will owe $(1 + r)^3D$. In each period, then, the debt will grow at the geometric rate $(1 + r)$.

Credit markets prevent this behavior (or they do not support such behavior indefinitely): lenders require that a borrower's debt stay within bounds, and at least they do not allow it to grow at the geometric rate $(1 + r)$. It can be proven mathematically that when the debt is constrained—by the prudent behavior of lenders—to grow less rapidly than the geometric rate $(1 + r)$, the borrower is forced to live within its means in the sense that the present discounted value of all its future consumption must equal the initial wealth plus the present discounted value of all future output net of investment:

$$C_1 + \frac{C_2}{(1 + r)} + \cdots = (1 + r)B_0^* + (Q_1 - I_1) + \frac{(Q_2 - I_2)}{(1 + r)} + \cdots \quad \textbf{(6.20)}$$

Let us define the country's net debt as D^*, which is just equal to $-B^*$. In other words, when B^* is negative (so that the country is a net debtor), D^* is positive. Now we can derive a very interesting equation. By bringing the terms in $(Q - I)$ to the other side of the equation, and remembering that the trade balance is equal to output minus absorption $(TB = Q - C - I)$, we can write (6.20) in the form

$$(1 + r)D_0^* = TB_1 + \frac{TB_2}{(1 + r)} + \cdots \quad \textbf{(6.21)}$$

This very important relationship says that if a country is a net debtor, and owes $(1 + r)D_0^*$ in the first period, then the economy must run trade surpluses in the future whose present discounted value (over the entire future) equals the initial net debt. The country services its debt into the future by a stream of trade-balance surpluses whose present value equals the net debt that is owed to the rest of the world.

Be careful to interpret the condition established in equation (6.21) correctly, however. It does not require that a debtor country have a trade surplus in every period, but only that the present value of all future trade balances must be in surplus, equal to the value of the net debt. For example,

[15] After Charles Ponzi, a Boston wheeler-dealer, who became rich with a scheme of chain letters in the 1920s.

the United States at the end of 1988 had net foreign liabilities in the order of $532 billion. This means that from 1989 onward, the United States will have to run trade surpluses in present-value terms of $532 billion. Of course, this does not imply that the United States will have to run trade surpluses in every period.

Notice, however, another subtle point. Even though a country cannot run a debt that grows forever at the rate of interest, it never has to pay off its debt fully either. What is required is that the country pay *interest* on its foreign debt (by running trade surpluses), not that the debt go to zero by some specific date. Thus, a country could maintain a given net debt D each year, and pay the interest due, rD, by running a trade surplus, without the principal D ever returning to zero.

The intertemporal budget constraint of the country is sometimes stated in terms of the *net resource transfer* (NRT) that a country must make. The NRT measures the cash flow between the country and its creditors, and it is measured as the net loans made to the country by its creditors, minus the interest that the country pays on its foreign liabilities (what creditors "take"). Thus the NRT in period t is given as

$$NRT = (D^* - D^*_{-1}) - rD^*_{-1} \tag{6.22}$$

Notice that in a "Ponzi scheme," the net resource transfer is precisely zero, since the amount of new borrowing is just enough to pay the old debt: $D^* = (1 + r)D^*_{-1}$, so that NRT = 0.

Because the increase in net foreign debt $(D^* - D^*_{-1})$ corresponds to the current account deficit $(-CA)$, while the interest payments correspond to the deficit on the service account, equation (6.22) can readily be restated in terms of the trade balance:[16]

$$\text{NRT} = -TB \tag{6.23}$$

Thus, when a country is running a trade-balance deficit, it is receiving a net resource transfer from its creditors, and when it is running a trade-balance surplus, it is making a net resource transfer to its creditors (in which case, we sometimes say that the NRT to the country is negative).

Now the budget constraint for a debtor can be stated as the condition that the negative of the discounted value of future net resource transfers must equal the size of debt:

$$(1 + r)D^*_0 = -NRT_1 - \frac{NRT_2}{(1 + r)} - \frac{NRT_3}{(1 + r)^2} - \cdots \tag{6.24}$$

Obviously, this condition is the same as (6.21), since the NRT is equal to the trade-balance surplus. Note also that the NRT condition rules out a Ponzi scheme because in a Ponzi scheme, the NRT is always zero.

We should mention, once again, a limitation we pointed to earlier. The "no-Ponzi scheme" condition is a plausible condition for capital markets, but lenders do not always impose it successfully. Sometimes borrowers are—inadvertently—allowed to borrow so much that they simply cannot

[16] Actually, the NRT is equal to the trade balance plus nonfactor services (mostly tourism, freight, and insurance). For simplicity, we have not considered in our analysis nonfactor services. However, the equations can be easily extended to include this account, and nothing substantial would change.

repay their loans. We have so far assumed that defaults do not happen, but we shall return to that issue at the end of the chapter.

6-5 Limitations on Foreign Borrowing and Lending

So far, when we have discussed the open economy, we have assumed that residents in one country can borrow from or lend to foreigners on a world capital market at a given interest rate r. This, of course, is a highly idealized view. We must now add in three major limitations to our basic framework: (1) administrative controls, which limit the access of domestic residents to foreign capital markets; (2) the effects of the country's own saving and investment decisions on the world interest rate; and (3) the risk and enforcement problems in foreign borrowing and lending, which limit the extent of international capital flows.

Administrative Controls

Many governments, especially those in developing countries, impose restrictions on the ability of domestic residents to borrow and lend abroad. Here we look at the basic consequences of these controls and some of the reasons that such controls are instituted. In later chapters we shall examine their effects in further detail.

With complete capital controls there could be no borrowing from or lending to the rest of the world. The country would live in financial isolation. Its current account would have to balance in every single period. Domestic interest rates would bear no relationship to world rates. They would simply adjust to equilibrate saving and investment as they did in the model of the closed economy described at the beginning of the chapter.

Let us return for a moment to Figure 6-4. Without capital controls, the current account is in surplus at the rate r_h. If the government decides to impose controls, excess domestic saving cannot be used to buy foreign bonds or to invest abroad. With saving higher than investment, r_h cannot be the equilibrium interest rate at home. Because the current account has to be balanced, the domestic rate will have to fall until saving equals investment. This occurs at the rate r_a. For a country that would have a current account surplus with *free* capital mobility, the net effect of controls is to reduce domestic interest rates, raise investment, and lower saving.

By forcing the economy into financial autarky (that is, isolation from the rest of the world), capital controls can have adverse effects on the level of economic well-being. We can use the two-period model to illustrate this quite simply. In Figure 6-9, let E be the endowment point, with the utility level UL_0. If world interest rates are at level r, then the country would like to borrow in the first period and consume at the point A. This would allow economic agents to reach the utility level UL_1. Instead, the economy must stay at E because of the capital controls. The same loss in welfare as the result of capital controls is readily found in the case in which the country would be in current account surplus in the first period in the absence of capital controls.

With capital controls in place, the kinds of shocks that we considered earlier will, in general, affect the domestic interest rate rather than the

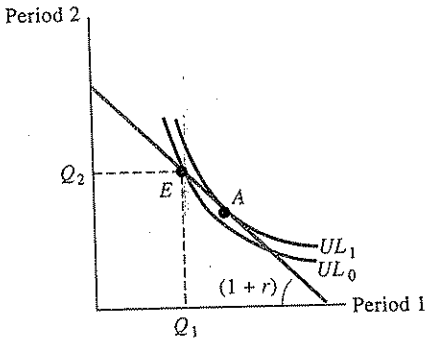

Figure 6-9
Capital Controls and the Economic Well-being of the Country

current account. For example, a temporary decline in output following a drought caused a current account deficit in Figure 6-6. Now, the effect is to raise interest rates, as Figure 6-10 shows.

To summarize, then, the shocks which shift the saving curve to the left tend to increase the domestic interest rate rather than to worsen the current account. The same applies for shocks that increase investment possibilities at home. With full capital controls, a rise in the world interest rate does not have a direct effect on the domestic interest rate, saving, or investment. By virtue of its restrictions on capital, the country becomes insulated from foreign interest-rate shocks.

One crucial policy implication of capital controls involves national saving policies. Many governments adopt policies to encourage saving (tax incentives, for example), with the aim of increasing investment. When capital markets are open, a policy that raises national saving tends to increase the current account surplus but not domestic investment. In this case, capital controls might be useful to translate a rise in domestic saving into a rise in domestic investment.

Large-Country Effects on World Interest Rates

The notion that domestic residents can borrow or lend freely at a given rate r is based on the assumption that their particular economy is a small part of the world capital market. This is a good approximation for most countries in

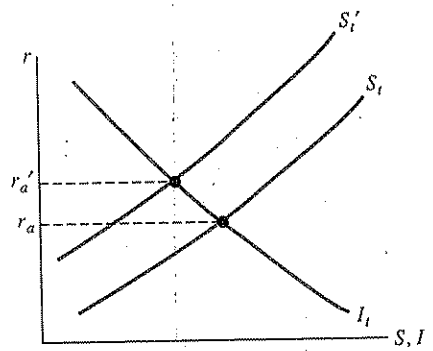

Figure 6-10
A Temporary Output Drop Under Capital Controls

the world, other than a handful of the largest industrialized economies. Even a major industrial economy such as the Netherlands represents only 1.6 percent of the total output of the industrialized countries.[17] Therefore, even fairly sizable shifts in this country's saving or capital formation would not have much effect on world capital market equilibrium. In contrast, the United States contributes about 36 percent of the total output of the industrialized countries. Movements of desired saving and investment in the United States tend to have significant effects on world interest rates. The same is true of Japan and Germany, and to a lesser extent in the United Kingdom, France, Italy, and Canada.[18]

The key to understanding large-country effects is to examine the determination of the world interest rate (r_w). In an integrated global capital market, r_w is determined so that total world saving S_w (equal to the sum of saving in country 1, country 2, and so on, so that $S_w = S_1 + S_2 + \cdots$) is equal to total investment ($I_w = I_1 + I_2 + \cdots$). The world as a whole is a closed economy. Therefore it must be the case that $S_w = I_w$.

Let us consider now the case of an economy, say, the United States, which is large relative to the overall world market. (Following our usual convention, an unstarred variable refers to the home country, while a starred variable refers to the rest of the world.) The global equilibrium occurs where

$$I(r) + I^*(r) = S(r) + S^*(r) \tag{6.25}$$

Condition (6.25) states that world investment equals world saving. By rearranging its terms, we see that this expression is equivalent to saying that the U.S. current account balance must equal the opposite of the current account balance of the rest of the world:[19]

$$S(r) - I(r) = -[S^*(r) - I^*(r)] \tag{6.26}$$

or

$$CA(r) = -CA^*(r) \tag{6.26'}$$

Figure 6-11 shows the equilibrium world interest rate as that rate at which the U.S. current account deficit is equal in value to the foreign current account surplus. If the two regions start in financial autarky, either because the United States or the rest of the world has capital controls, the equilibrium interest rates would be set separately in the two markets. As drawn in the graph, the domestic rate in the United States (r_a) would be higher than the rate in the rest of the world (r_a^*). This is because the United States has been drawn (realistically!) as having a low saving rate.

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[17] Figure for the year 1988, from The World Bank, *World Development Report 1990* (New York: Oxford University Press, 1990).

[18] These largest seven industrial countries are often called the Group of Seven, or G-7 for short.

[19] In theory, the sum of the current accounts of all the countries in the world should sum to zero. In practice, this is not the case. There is, in fact, a "world current account discrepancy," in which the total of the current accounts of all the countries in the world have summed to a large negative number in recent years, on the order of −$67 billion in 1989 (International Monetary Fund, *International Financial Statistics*, 1989 Yearbook). This discrepancy is attributed to a variety of measurement problems, including unrecorded capital flows and under- and overinvoicing of exports and imports, often for the purposes of smuggling.

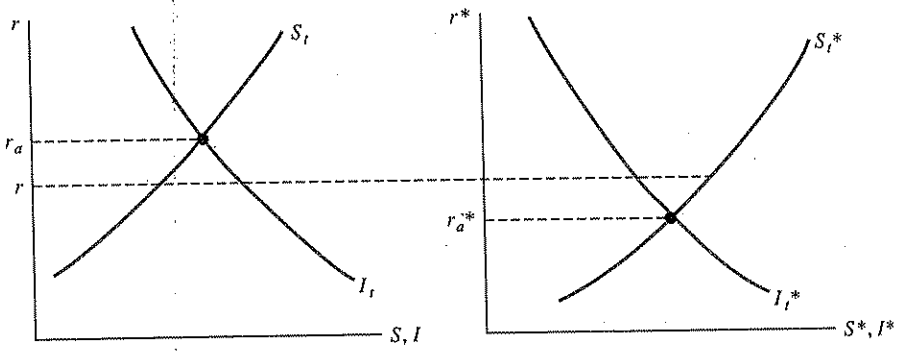


Figure 6-11
Global World Equilibrium of Saving and Investment

If complete capital mobility between the two regions were established, for example, via a capital market liberalization in the restricted region, a single world interest rate would result. The domestic interest rate in the U.S. economy would fall and the rate in the rest of the world would rise until both rates became the same. Investment would increase and saving would fall in the United States, and its current account would move into deficit. In the rest of the world, saving would rise and investment would fall: its current account in the rest of the world would move into surplus. In the final equilibrium, total world saving would equal total world investment, and the U.S. current account deficit would be exactly matched by the surplus in the rest of the world.

These two diagrams help us to discover another important point: for a large country, shifts in saving and investment provoke effects on world (and domestic) interest rates as well as in the current account. Consider, for example, a fall in the U.S. saving rate, as shown in Figure 6-12. (Such a decline in saving might arise because of a rise in expected future income in the United States). At the initial interest rate (r_0), the decline in saving leads to an excess of world investment over world saving. World interest rates therefore rise to r_1, where $(I - S)$ again equals $(S^* - I^*)$.

Figure 6-12
Global Effects of a Decline in United States Saving

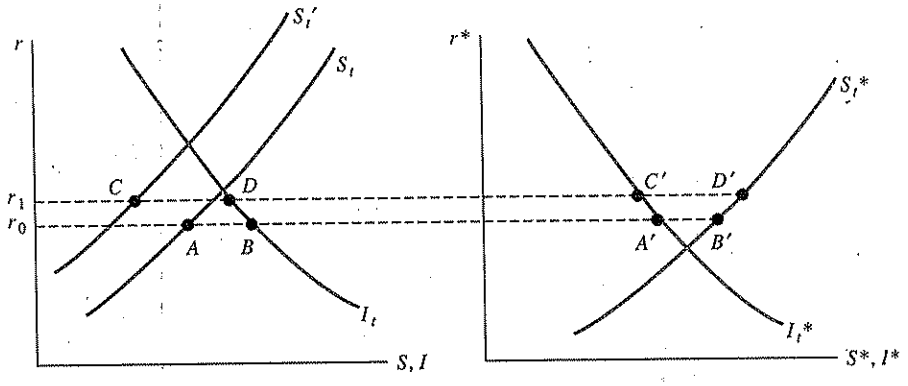


TABLE 6-7

THE EFFECTS OF SAVINGS AND INVESTMENT SHOCKS UNDER DIFFERENTIAL CAPITAL MOBILITY AND SIZES OF COUNTRIES

	Cases		
Kind of Shock	**Free Capital Mobility (small country)**	**Capital Controls**	**Free Capital Mobility (large country)**
Rise in the S curve	Rise in CA; no effect on r	No effect on CA; fall in r	Rise in CA; fall in r
Rise in the I curve	Fall in CA; no effect on r	No effect on CA; rise in r	Fall in CA; rise in r
Rise in $(S^* - I^*)$	Fall in CA; fall in r	No effect on CA; no effect on r	Fall in CA; fall in r

The final effect is an increase in the world interest rate and a worsening of the current account in the United States (from AB to CD), coupled with an improvement in the current account in the rest of the world (from $A'B'$ to $C'D'$). The larger the United States is in world markets, the more adjustment will occur through a rise in the interest rate. The smaller the United States is, the more adjustment will come through a deterioration in the U.S. current account. Thus, the large-country case falls somewhere between the small-country model and the capital controls case in the effect of the shift in saving on the current account and on the interest rate.

Table 6-7 summarizes the various cases we have considered here. Each column in Table 6-7 corresponds to one of the three cases analyzed: a small country with free capital mobility, a small country with capital controls, and a large country with free capital mobility. Each row corresponds to a different type of shock: an increase in the desired saving in the home country, an increase in desired investment, and a rise in saving in the rest of the world. The rest of the table describes the effects for each combination.

Risk and Enforcement Problems

To simplify the analysis, we have assumed so far that all loans are repaid (or serviced in full in present-value terms). There are at least two reasons why, in reality, this might not be the case. First, the borrower might become insolvent, that is, unable to service the debts in full out of the stream of current and future income. Second, the borrower might choose not to repay the loans, believing that the costs of nonpayment are less than the burden of repayment.

Voluntary nonpayment can occur because international loans present a serious problem of enforcement. It is hard for lenders to collect their loans when a foreign debtor has a repayment problem, because the problems of legal enforcement of contracts is particularly difficult when the creditor and debtor are in different countries. This is especially true of loans to foreign governments, which are often called *sovereign loans*, since it is difficult to

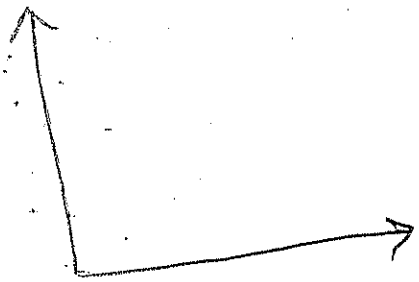
compel a foreign government to honor a debt. In this case, lenders will not provide all the funds that the foreign borrower wants at the prevailing interest rate. Rather, they will lend only as much as they think can be collected.

When a borrower government has a large external debt, it must grapple with the choice of repaying the loan versus suspending its debt-service payments. The government must calculate the benefits of suspending payments (the foreign exchange that it saves) versus the costs of such action. These include various penalties for nonpayment, plus the costs of a bad reputation, which can harm the country in its future dealings with foreign creditors. The direct penalties that can be imposed by disgruntled creditors include (1) a suspension of further lending, (2) a withdrawal of short-term lending to support exports and imports, (3) an attempt to disrupt the international trade of the country, and (4) an attempt to disrupt the foreign relations of the country. These penalties can impose burdens on defaulting countries, but they do not generally yield much in the way of direct financial benefits for the lenders.

These penalties help to define the limits of safe lending. If the penalties for nonpayment are very high, and are known to be high, then the debtor government attempts to repay as much as possible, lest the penalties be incurred. In this case, it is safe to lend to a foreign government, since it will make a strong attempt to repay its loans. If the penalties are small, foreign governments will not make much of an effort at repayment, so it is rather unsafe to lend even small amounts.

What is important for us here is that as long as enforcement problems exist, there will probably be a smaller flow of international lending than there would be if contracts were perfectly enforceable. At first, residents of a borrower country will find that they face a higher rate of interest the more their country borrows from the rest of world, the higher interest rate representing a risk premium to compensate the lenders for the growing risk of default. After a certain amount of debt has been incurred, the risks of lending to the country cannot be compensated by a higher risk premium, and the country is simply cut off from additional credits.

The full implications of this kind of credit rationing require a thorough and separate analysis. But in essence, the current account behaves somewhat like the case of a large country: shifts in saving and investment affect *both* the current account and the interest rate. (These points are discussed in more detail in later chapters.)



6-6 Summary

In an economy with free capital mobility, national saving does not have to equal national investment. The excess of saving over investment is the *current account of the balance of payments*. The current account balance tends to be an increasing function of the interest rate because a higher interest rate tends to increase saving (though the effect is theoretically ambiguous) and to reduce investment.

A current account *surplus* also means that a country is accumulating net international assets; that is, its net claims on the rest of the world are increasing. A current account *deficit* means that a country is decumulating net international assets. Thus, the current account is also defined as the change in the *net international investment position* (NIIP) of a country.

When the NIIP is positive, the country is a net creditor of the rest of the world, and when it is negative the country is a net debtor. There are two additional ways to define the current account: first, as the difference between national income and absorption; and second, as the sum of the trade account and the service account of the balance of payments.

During the 1980s, the United States was transformed from the world's largest international creditor into the world's largest debtor as a result of large and sustained current account deficits. (Nonetheless, data problems prevent us from getting an exact measure of the net debt position.) Over the same period, Japan and West Germany ran vast current account surpluses and became the major international creditors.

Many factors influence the current account. A rise in world interest rates will tend to improve the CA balance of a small country by raising saving and reducing investment. Increased investment prospects (say, because of a natural resource discovery) tend to reduce the CA balance. A transitory fall in national income (say, because of a fall in the terms of trade or an unfavorable harvest), tends to lower the CA balance by reducing national saving. A permanent decline in national income, however, should have little or no effect on the current account, since consumption spending should fall by approximately the same amount as the decline in income. (Of course, if the permanent shock is widely but wrongly interpreted to be temporary, then the current account would nonetheless decline.) In general, the optimal response to supply shocks (either in output levels or the terms of trade) can be summarized in the phrase "finance a transitory shock; adjust to a permanent shock."[20]

Countries, like individuals, are bound by an intertemporal budget constraint: the discounted value of aggregate consumption must be equal to the discounted value of national production minus the discounted value of investment, *plus* the initial net international investment position. This can be put another way. If a country is a net debtor, then the economy must run trade surpluses in the future with a present discounted value equal to the initial net debt.

Several limitations must be added in to the basic model of borrowing and lending. First, some governments establish administrative restrictions (*capital controls*) to international borrowing or lending. With complete capital controls, there is no borrowing from or lending to the rest of the world, and the country must live in financial isolation. Domestic interest rates would differ from world rates and the current account would have to be zero every period. Domestic saving would always have to equal domestic investment.

Second, the basic model of borrowing and lending assumes that the country is sufficiently small that shifts in its domestic investment and saving do not affect the world interest rate. This assumption pretty well describes the case for most countries in the world except for a handful of industrialized economies. For these large economies, changes in domestic saving and investment will tend to have significant effects on world interest rates. In an

[20] "Finance," here, means to run a current account deficit; "adjust" means to lower consumption by enough to absorb the shock without borrowing.

integrated world capital market, the international interest rate is determined so that total world saving is equal to total investment.

Third, the basic model assumes that all loans are repaid (or at least serviced in full in present-value terms). However, some borrowers may become insolvent (unable to service their debts in full out of current and future income), while others who could pay may choose to default, knowing that it is hard for the creditor to force a repayment of the loans. The difficulty of enforcing loan payments is especially great for sovereign loans, that is, loans to foreign governments. When potential lenders understand that the borrower may have an incentive to default in the future, they will restrict the supply of loans to that borrower to the level that the lender believes will be repaid.

Key Concepts

balance of payments
current account
net international investment position
net creditor country
net debtor country
absorption
small-country assumption
trade balance
service balance
official development assistance
terms of trade
capital account
capital outflow
capital inflow
official foreign-exchange reserves
errors and omissions
national intertemporal budget constraint
net resource transfer
capital controls
capital mobility
large-country effects
sovereign loans

Problems and Questions

1. Country A is a small open economy. Would it be possible for this country to have an interest rate different from that of the rest of the world? Why?

2. Countries that run current account surpluses are likely to decrease their consumption in the future. True or false? Explain.

3. Discuss why the United States shifted during the 1980s from being a major creditor into being the world's largest debtor.

4. Discuss the relation between an increase in the net holdings of international assets, a surplus in the current account, and a positive trade balance.

5. Assume that country B is a net creditor. The value of national saving is fixed at a certain level, and initially, its current account is zero. What would happen to the following variables if the value of this country's international assets goes up because of changes in their valuation?

a. Net international investment position.
b. Current account.
c. Investment.

6. How would Figures 6-4a and 6-4b change if the income effect for savers becomes larger than the substitution effect above a certain level of the international interest rate?

7. Describe the effects on the interest rate, domestic savings, and domestic investment of the following events (analyze the cases of a closed economy, a